

Amendments to the Claims

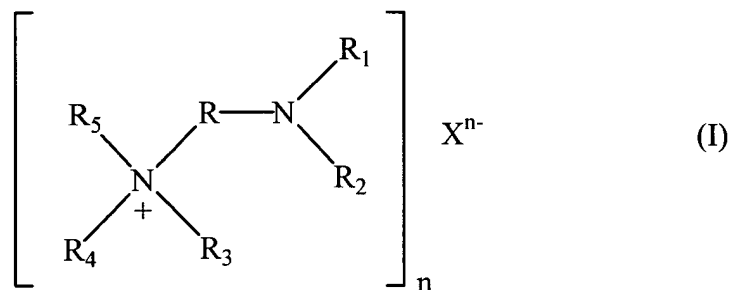
The following listing of claims replaces all prior versions of the claims and all prior listings of the claims in the present application.

1-50. (canceled)

51. (new) A tyre for a vehicle wheel, comprising at least one structural element comprising an elastomeric composition, the elastomeric composition comprising:

at least one diene elastomeric polymer; and

at least one organic quaternary ammonium salt having a following general formula (I):

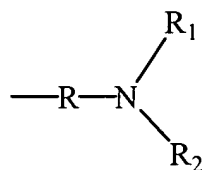


wherein R represents a linear or branched C₁-C₂₂ alkylene group; a linear or branched C₂-C₂₂ alkenylene group; a C₆-C₁₈ arylene group; and/or a C₇-C₂₀ alkylarylene or alkylenearylene group; the group or groups optionally containing at least one heteroatom selected from oxygen, nitrogen, and/or sulfur,

wherein R₁ and R₂, which may be identical or different, represent a linear or branched C₁-C₂₂ alkyl group; a linear or branched C₂-C₂₂ alkenyl group; a C₆-C₁₈ aryl group; and/or a C₇-C₂₀

arylalkyl or alkylaryl group; the group or groups optionally containing at least one heteroatom selected from oxygen, nitrogen, and/or sulfur; or, R_1 and R_2 , considered jointly with the nitrogen atom to which they are linked, represent a C_5 - C_{18} heterocyclic ring optionally containing a second heteroatom selected from oxygen, nitrogen, and/or sulfur; or, R_1 and R_5 and/or R_2 and R_3 , considered jointly with the nitrogen atoms to which they are linked, represent a C_5 - C_{18} heterocyclic ring,

wherein R_3 , R_4 , and R_5 , which may be identical or different, represent a linear or branched C_1 - C_{22} alkyl group; a linear or branched C_2 - C_{22} alkenyl group; a C_6 - C_{18} aryl group; a C_7 - C_{20} arylalkyl or alkylaryl group; and/or a group having a following formula:



wherein R , R_1 , and R_2 , have the same meanings as disclosed above; or two from R_3 , R_4 , and R_5 , considered jointly with the nitrogen atom to which they are linked, represent a C_5 - C_{18} heterocyclic ring optionally containing a second heteroatom selected from oxygen, nitrogen, and/or sulfur,

wherein X^{n-} represents an inorganic or organic anion group, and

wherein n represents 1, 2, or 3.

52. (new) The tyre of claim 51, comprising:

a carcass structure;

a belt structure;
a tread band; and
a pair of sidewalls;
wherein the carcass structure comprises at least one carcass ply,
wherein the at least one carcass ply is shaped in a substantially toroidal configuration,
wherein opposite lateral edges of the carcass structure are associated with respective bead
wires,
wherein each bead wire is enclosed in a respective bead,
wherein the belt structure comprises at least one belt strip applied in a circumferentially
external position relative to the carcass structure;
wherein the tread band is superimposed circumferentially on the belt structure,
wherein the sidewalls are applied laterally on opposite sides relative to the carcass
structure, and
wherein the at least one structural element comprising the elastomeric composition is the
tread band.

53. (new) The tyre of claim 51, wherein the elastomeric composition is substantially
free of additional secondary accelerators.

54. (new) The tyre of claim 51, wherein the elastomeric composition is substantially
free of diphenyl guanidine (DPG).

55. (new) The tyre of claim 51, wherein X^{n-} is selected from: halide ions such as iodine, bromine, fluorine, or chlorine ions; ipoiodite ion; ipobromite ion; fluorite ion; chlorite ion; iodite ion; bromite ion; fluorine ion; chlorite ion; iodate ion; bromate ion; fluorate ion; chlorate ion; periodate ion; perbromate ion; perfluorate ion; perchlorate ion; nitrate ion; nitrite ion; sulfate ion; sulfite ion; phosphate ion; phosphite ion; hydroxide ion; or an anion group represented by a following formulae (II) to (V):



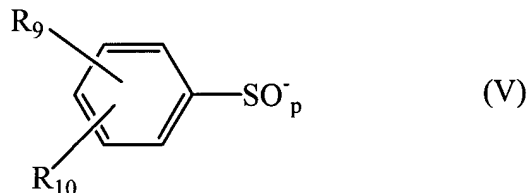
wherein R_6 represents a linear or branched C_1 - C_{18} alkyl group; a linear or branched C_2 - C_{18} alkenyl group; a C_6 - C_{18} aryl group; or a C_7 - C_{20} arylalkyl or alkylaryl group; the group or groups optionally containing at least one of the following: a hydroxyl group, a carbonyl group, an ether group, a thioether group, and/or an ester group;



wherein m represents 0 or 1; R_7 represents a linear or branched C_1 - C_{18} alkylene group; a linear, branched or cyclic C_2 - C_{18} alkenylene group; a C_6 - C_{18} arylene group; or a C_7 - C_{20} arylalkylene or alkylarylene group; the group or groups optionally containing at least one of the following: a hydroxyl group, a carbonyl group, an ether group, a thioether group, and/or an ester group;



wherein p represent 3 or 4; R_8 represents a linear or branched $\text{C}_1\text{-C}_{18}$ alkyl group; a linear or branched $\text{C}_2\text{-C}_{18}$ alkenyl group; a $\text{C}_6\text{-C}_{18}$ aryl group; or a $\text{C}_7\text{-C}_{20}$ arylalkyl or alkylaryl group; the group or groups optionally containing at least one of the following: a hydroxyl group, a carbonyl group, an ether group, a thioether group, and/or an ester group;



wherein p represents 3 or 4; R_9 and R_{10} , which may be identical or different, represent a hydrogen atom; a linear or branched $\text{C}_1\text{-C}_{18}$ alkyl group; a linear or branched $\text{C}_2\text{-C}_{18}$ alkenyl group; a $\text{C}_6\text{-C}_{18}$ aryl group; and/or a $\text{C}_7\text{-C}_{20}$ arylalkyl or alkylaryl group; the group or groups optionally containing at least one of the following: a hydroxyl group, a carbonyl group, an ether group, a thioether group, and/or an ester group.

56. (new) The type of claim 55, wherein R and R_7 represent one or more of: methylene, ethylene, propylene, butylene, 2,2-dimethyl-1,3-propylene, hexylene, 2-methyl-3-ethyl-1,4-butylene, octylene, vinylene, butenylene, isobutenylene, pentenylene, hexenylene, phenylene, naphthylene, diphenylene, benzenylene, phenylmethylene, phenylethylene, naphthylmethylene, naphthylethylene, methylphenylene, ethylphenylene, methylnaphthylene, and ethylnaphthylene.

57. (new) The tyre of claim 55, wherein R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , R_8 , R_9 , and R_{10} represent one or more of: methyl, ethyl, propyl, isopropyl, butyl, isobutyl, pentyl, hexyl, octyl, allyl, methallyl, 2-butenyl, propenyl, hexenyl, octenyl, benzyl, phenyl, naphthyl, methylbenzyl, ethylbenzyl, diphenyl, methylphenyl, ethylphenyl, methylnaphthyl, and ethylnaphthyl.

58. (new) The tyre of claim 51, wherein R_1 and R_2 , considered jointly with the nitrogen atom or atoms to which they are linked, represent one or more of: morpholine, pyrrolidine, piperidine, N-methyl-piperidine, piperazine, thiomorpholine, thiazolidine, benzothiazolidine, and imidazole.

59. (new) The tyre of claim 51, wherein R_1 and R_5 and/or R_2 and R_3 , considered jointly with the nitrogen atoms to which they are linked, represent one or more of: piperazine and 1,8-diazabicyclo[2.2.2]octane.

60. (new) The tyre of claim 51, wherein in a case wherein two from R_3 , R_4 , and R_5 , considered jointly with the nitrogen atom or atoms to which they are linked, represent a C_5 - C_{18} heterocyclic ring, the heterocyclic ring or rings represent one or more of: pyrrolidinium, piperidinium, piperazinium, and imidazolium.

61. (new) The tyre of claim 51, wherein the at least one organic quaternary ammonium salt is present in the elastomeric composition in an amount from 0.1 phr to 10 phr.

62. (new) The tyre of claim 51, wherein the at least one organic quaternary ammonium salt is present in the elastomeric composition in an amount from 0.5 phr to 5 phr.

63. (new) The tyre of claim 51, wherein the at least one diene elastomeric polymer has a glass transition temperature (T_g) below 20° C.

64. (new) The tyre of claim 63, wherein the at least one diene elastomeric polymer comprises one or more of: cis-1,4-polyisoprene; 3,4-polyisoprene; polybutadiene; optionally halogenated isoprene/isobutene copolymers; 1,3-butadiene/acrylonitrile copolymers; styrene/1,3-butadiene copolymers; styrene/isoprene/1,3-butadiene copolymers; and styrene/1,3-butadiene/acrylonitrile copolymers.

65. (new) The tyre of claim 51, wherein the elastomeric composition further comprises at least one elastomeric polymer of one or more monoolefins with an olefinic comonomer or derivatives thereof.

66. (new) The tyre of claim 65, wherein the at least one elastomeric polymer comprises one or more of: ethylene/propylene copolymers (EPR) or ethylene/propylene/diene copolymers (EPDM); polyisobutene; butyl rubbers; and halobutyl rubbers.

67. (new) The tyre of claim 51, wherein the elastomeric composition further comprises at least one primary accelerator.

68. (new) The tyre of claim 67, wherein the at least one primary accelerator is selected from thiazoles, sulphenamides, and/or xanthogenates.

69. (new) The tyre of claim 67, wherein the at least one primary accelerator is selected from sulphenamides.

70. (new) The tyre of claim 67, wherein the at least one primary accelerator is present in the elastomeric composition in an amount from 0.1 phr to 10 phr.

71. (new) The tyre of claim 67, wherein the at least one primary accelerator is present in the elastomeric composition in an amount from 0.5 phr to 5 phr.

72. (new) The tyre of claim 51, wherein the elastomeric composition further comprises at least one reinforcing filler in an amount between 0.1 phr and 120 phr.

73. (new) The tyre of claim 72, wherein the at least one reinforcing filler comprises carbon black.

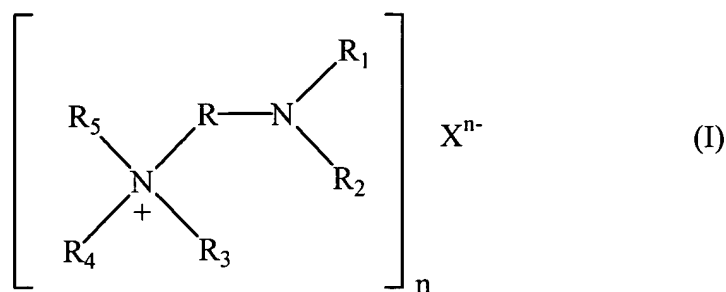
74. (new) The tyre of claim 72, wherein the at least one reinforcing filler comprises silica.

75. (new) The tyre of claim 74, wherein the elastomeric composition further comprises a silica coupling agent.

76. (new) A tread band for a tyre, the tread band comprising a crosslinkable elastomeric composition, the elastomeric composition comprising:

at least one diene elastomeric polymer; and

at least one organic quaternary ammonium salt having a following general formula (I):

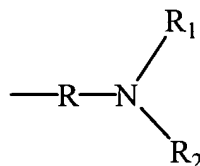


wherein R represents a linear or branched C₁-C₂₂ alkylene group; a linear or branched C₂-C₂₂ alkenylene group; a C₆-C₁₈ arylene group; and/or a C₇-C₂₀ alkylarylene or alkylenearylene group; the group or groups optionally containing at least one heteroatom selected from oxygen, nitrogen, and/or sulfur,

wherein R₁ and R₂, which may be identical or different, represent a linear or branched C₁-C₂₂ alkyl group; a linear or branched C₂-C₂₂ alkenyl group; a C₆-C₁₈ aryl group; and/or a C₇-C₂₀ arylalkyl or alkylaryl group; the group or groups optionally containing at least one heteroatom selected from oxygen, nitrogen, and/or sulfur; or, R₁ and R₂, considered jointly with the nitrogen atom to which they are linked, represent a C₅-C₁₈ heterocyclic ring optionally containing a

second heteroatom selected from oxygen, nitrogen, and/or sulfur; or, R₁ and R₅ and/or R₂ and R₃, considered jointly with the nitrogen atoms to which they are linked, represent a C₅-C₁₈ heterocyclic ring,

wherein R₃, R₄, and R₅, which may be identical or different, represent a linear or branched C₁-C₂₂ alkyl group; a linear or branched C₂-C₂₂ alkenyl group; a C₆-C₁₈ aryl group; a C₇-C₂₀ arylalkyl or alkylaryl group; and/or a group having a following formula:



wherein R, R₁, and R₂, have the same meanings as disclosed above; or two from R₃, R₄, and R₅, considered jointly with the nitrogen atom to which they are linked, represent a C₅-C₁₈ heterocyclic ring optionally containing a second heteroatom selected from oxygen, nitrogen, and/or sulfur,

wherein Xⁿ⁻ represents an inorganic or organic anion group, and

wherein n represents 1, 2, or 3.

77. (new) The tread band of claim 76, wherein the elastomeric composition is substantially free of additional secondary accelerators.

78. (new) The tread band of claim 76, wherein the elastomeric composition is substantially free of diphenyl guanidine (DPG).

79. (new) The tread band of claim 76, wherein the at least one organic quaternary ammonium salt is present in the elastomeric composition in an amount from 0.1 phr to 10 phr.

80. (new) The tread band of claim 76, wherein the at least one diene elastomeric polymer has a glass transition temperature (T_g) below 20° C.

81. (new) The tread band of claim 76, wherein the elastomeric composition further comprises at least one elastomeric polymer of one or more monoolefins with an olefinic comonomer or derivatives thereof.

82. (new) The tread band of claim 76, wherein the elastomeric composition further comprises at least one primary accelerator.

83. (new) The tread band of claim 82, wherein the at least one primary accelerator is selected from thiazoles, sulphenamides, and/or xanthogenates.

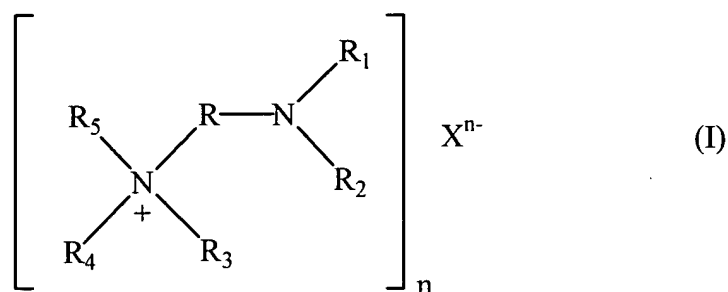
84. (new) The tread band of claim 76, wherein the elastomeric composition further comprises at least one reinforcing filler in an amount between 0.1 phr and 120 phr.

85. (new) The tread band of claim 84, wherein the at least one reinforcing filler comprises carbon black.

86. (new) The tread band of claim 84, wherein the at least one reinforcing filler comprises silica.

87. (new) The tread band of claim 86, wherein the elastomeric composition further comprises a silica coupling agent.

88. (new) A crosslinkable elastomeric composition, comprising:
at least one diene elastomeric polymer; and
at least one organic quaternary ammonium salt having a following general formula (I):

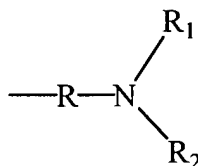


wherein R represents a linear or branched C₁-C₂₂ alkylene group; a linear or branched C₂-C₂₂ alkenylene group; a C₆-C₁₈ arylene group; and/or a C₇-C₂₀ alkylarylene or alkylenearylene group; the group or groups optionally containing at least one heteroatom selected from oxygen, nitrogen, and/or sulfur,

wherein R₁ and R₂, which may be identical or different, represent a linear or branched C₁-C₂₂ alkyl group; a linear or branched C₂-C₂₂ alkenyl group; a C₆-C₁₈ aryl group; and/or a C₇-C₂₀ arylalkyl or alkylaryl group; the group or groups optionally containing at least one heteroatom

selected from oxygen, nitrogen, and/or sulfur; or, R_1 and R_2 , considered jointly with the nitrogen atom to which they are linked, represent a C_5 - C_{18} heterocyclic ring optionally containing a second heteroatom selected from oxygen, nitrogen, and/or sulfur; or, R_1 and R_5 and/or R_2 and R_3 , considered jointly with the nitrogen atoms to which they are linked, represent a C_5 - C_{18} heterocyclic ring,

wherein R_3 , R_4 , and R_5 , which may be identical or different, represent a linear or branched C_1 - C_{22} alkyl group; a linear or branched C_2 - C_{22} alkenyl group; a C_6 - C_{18} aryl group; a C_7 - C_{20} arylalkyl or alkylaryl group; and/or a group having a following formula:



wherein R , R_1 , and R_2 , have the same meanings as disclosed above; or two from R_3 , R_4 , and R_5 , considered jointly with the nitrogen atom to which they are linked, represent a C_5 - C_{18} heterocyclic ring optionally containing a second heteroatom selected from oxygen, nitrogen, and/or sulfur,

wherein X^{n-} represents an inorganic or organic anion group, and

wherein n represents 1, 2, or 3.

89. (new) The elastomeric composition of claim 88, wherein the elastomeric composition is substantially free of additional secondary accelerators.

90. (new) The elastomeric composition of claim 88, wherein the elastomeric composition is substantially free of diphenyl guanidine (DPG).

91. (new) The elastomeric composition of claim 88, wherein the at least one organic quaternary ammonium salt is present in the elastomeric composition in an amount from 0.1 phr to 10 phr.

92. (new) The elastomeric composition of claim 88, wherein the at least one diene elastomeric polymer has a glass transition temperature (T_g) below 20° C.

93. (new) The elastomeric composition of claim 88, further comprising at least one elastomeric polymer of one or more monoolefins with an olefinic comonomer or derivatives thereof.

94. (new) The elastomeric composition of claim 88, further comprising at least one primary accelerator.

95. (new) The elastomeric composition of claim 94, wherein the at least one primary accelerator is selected from thiazoles, sulphenamides, and/or xanthogenates.

96. (new) The elastomeric composition of claim 88, further comprising at least one reinforcing filler in an amount between 0.1 phr and 120 phr.

97. (new) The elastomeric composition of claim 96, wherein the at least one reinforcing filler comprises carbon black.

98. (new) The elastomeric composition of claim 96, wherein the at least one reinforcing filler comprises silica.

99. (new) The elastomeric composition of claim 98, wherein the elastomeric composition further comprises a silica coupling agent.

100. (new) A crosslinked elastomeric manufactured product obtained by crosslinking the elastomeric composition of claim 88.